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NATIONAL TRANSPORTATION SAFETY BOARD
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ANE-180 EVALUATION REPORT
OF PRATT & WHITNEY QUALITY SYSTEM
September 30, 1996

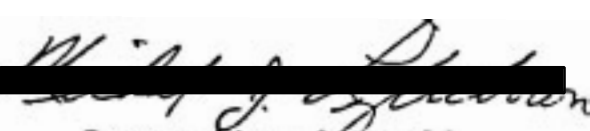
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ANE-180 EVALUATION REPORT

of

PRATT & WHITNEY QUALITY SYSTEM

(PHASE I)


Prepared by: ANE-180

September 30, 1996

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ATTACHMENTS:

- (1) PHASE I REPORT (PRATT & WHITNEY)**
- (2) PHASE II REPORT (VOLVO)**

1. BACKGROUND

As a result of the failure of PW JT8D-219, #1 Fan Hub on Delta Airlines Flight #1288 at Pensacola, Florida, on July 6, 1996, the Engine and Propeller Directorate, Manufacturing Inspection Office directed that an evaluation of the Pratt & Whitney Quality System be conducted. This evaluation was to be accomplished utilizing the Aircraft Certification Service Evaluation Program (ACSEP) criteria and to be conducted in two phases.

Phase I would be conducted at Pratt & Whitney's East Hartford, CT facility. The evaluation would commence on July 29 and conclude on August 2, 1996. The evaluation team would be led by Michael J. Lightbown and would be comprised of one Aviation Safety Inspector and two Aviation Safety Engineers. An evaluation plan was developed focusing on specific elements of the Pratt & Whitney Quality System, this included ACSEP Subsystems: Organization & Responsibility, Supplier Control, Non-Conforming Material (MRB), Design Data (Engineering Source Approval (ESA)), and Internal Audit.

Phase II of this evaluation would be conducted at Volvo Flygmotor, Trollhatten, Sweden. This phase would commence on August 13 and conclude on August 16, 1996. The team leader for this phase was John Varoli. His team was comprised of one Aviation Safety Inspector and one Aviation Safety Engineer. As with the Pratt & Whitney Phase, the ACSEP criteria was utilized and the evaluation was focused on specific areas: Design Data (ESA), Manufacturing Operations, Final Inspection, Material Review Board (MRB), material certifications, and non destructive testing including Fluorescent Penetrant Inspection (FPI) and Blue Etch Inspection.

This report provides a general overview of the evaluation conducted at the two sites. The specific details of each finding or special emphasis item are found in the attached trip reports and FAA Form 8100-6 records. It should be understood that the Pratt & Whitney System is one of the most complex Quality Systems in existence, due to the size of the organization and the complexity of the product they manufacture.

2. SCOPE/OBJECTIVE

The scope of this evaluation was extremely narrow due to the complexity of the Pratt & Whitney Quality System. Although narrow in scope, ample time was allocated to conduct an in-depth evaluation of each subsystem. It was not the intention of this evaluation to determine root cause of the failure to the #1 Fan Hub on Delta Flight 1288 but rather to verify that Pratt & Whitney is in compliance with FAR 21.165(a) & (b).

3. DISCUSSION

The Pratt & Whitney is structured around thirteen (13) "Product Centers" located at four (4) locations: East Hartford, Middletown, and North Haven, Connecticut and Berwick, Maine. It is accurate to depict each of the Product Centers as a company within themselves, each with their own working level procedures. A core organization provides

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some "umbrella" oversight including an audit function and some Material Review Board functions.

Volvo Flygmotor is a priority part supplier to Pratt & Whitney, located in Trollhatten, Sweden.

Phase I evaluation results are as follows: (see attached FAA 8100-6 Records)

- Non-compliance to inadequacies in Product Center and Core internal and supplier audit requirements.
- Non compliance to raw material supplier surveillance report requirements.
- Non-compliance to supplier Engineering Source Approval (ESA) significant change submittal/approval requirements
- Non-compliance to quality and technical flowdown requirements to suppliers.

Phase II evaluation results (see attached FAA 8100-6s) also follow:

- Volvo's noncompliance to engineering source Approval (PWA Specification 370) requirements in the areas of process qualification, significant change submittal/approval, and auditing.
- Missing tooling needed to perform final inspection.
- Non-compliance to surface finish inspection requirements.

4. CONCLUSION

The conclusions that can be drawn from this evaluation are as follows:

The audit process within the P&W system, both internal and external, should be subject to further evaluations. The entire audit function is a common thread in both phases of this evaluation.

Supplier Control is another common thread throughout the finding, observations, and special emphasis items. This subsystem should be evaluated throughout all Pratt & Whitney Product Centers.

Probably the item needing immediate attention is the Engineering Source Approval (ESA) process. This entire process is not normally addressed in the normal ACSEP evaluation. It is an area that has been overlooked and should be included in our future evaluations.

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Compliance to complex **systems** similar to P&W are taken for granted. A review of the flow chart for the Material Review Board (MRB) clearly depicts the size, dynamics and complexity of **systems** found in today's larger facilities.

It should not be concluded that **every** ACSEP would identify similar findings and observations to those documented during this evaluation. As mentioned earlier, this evaluation was narrow in scope, had specific objectives, and was performed by individuals with extensive quality **systems** and audit backgrounds.

5. RECOMMENDATIONS

Future ACSEP Evaluations should include those Product Centers directly involved in FAA activity.

Corrective actions of all findings and observations will be obtained utilizing the Compliance and Enforcement Program as outlined in Order 2150.3A.

The supplier control system at Pratt & Whitney (all Product Centers) should be evaluated for compliance to the FAR and adequacy of the **system**

Pratt & Whitney should provide to the FAA a complete listing of all "priority parts" suppliers, both international and domestic. The definition of a priority part should be provided by the Engine & Propeller Directorate, Engine Certification Office (ECO) and should identify the component by "nomenclature" i.e. major rotating parts, pressure vessels, etc.. Upon receipt of that list an aggressive plan to provide FAA surveillance of these suppliers should be established and resources necessary provided to accomplish the surveillance.

Pratt & Whitney provides 60% of the engines on today's commercial fleet; 85+% of the parts that make up Pratt engines are supplier manufactured; Pratt is an assembly line and only "manufactures 15% of the engines it sells.

The FAA provides one part-time Aviation Safety Inspector to oversee this entire operation. Based on the above statement, I would recommend an evaluation of our activity at this facility and entertain the possibility of additional resources mainly to oversee the "Quality System" portion of the P&W business.